

CLAIMS

What is claimed is:

1. A method for embolizing blood vessels, comprising:  
injecting an ultrasonic radiation micro-bubble reagent into a blood vessel; and  
irradiating said reagent with an ultrasonic wave in an area where embolus are desired to be formed.
2. The method of claim 1, wherein the irradiation causes said reagent to form blood vessel embolus in said area.
3. The method of claim 1, wherein the ultrasonic radiation is of a low frequency and a low energy.
4. The method of claim 3, wherein the low frequency ranges from about 20 to about 50kHz and the low energy comprises a power of about 0.3 to about 3W.
5. The method of claim 1, wherein the irradiation is performed for about 0.5 to about 60 minutes.
6. The method of claim 1, wherein the reagent is injected at a dose of about 1 to about 10 ml/kg.
7. A method for reducing the size of a tumor, the method comprising:  
providing an ultrasonic radiation micro-bubble reagent in a vessel providing blood to the tumor; and  
irradiating said reagent with ultrasonic radiation to cause said reagent to form blood vessel embolus.
8. The method of claim 7, wherein the reagent is injected at a dose of about 1 to about 10 ml/kg and the ultrasonic radiation is of a low frequency and a low energy.
9. A method for treating cancer, the method comprising:  
providing an ultrasonic radiation micro-bubble reagent in a vessel providing blood to a tumor of the cancer; and  
irradiating said reagent with ultrasonic radiation to cause said reagent to form blood vessel embolus.
10. The method of claim 9, wherein the reagent is injected at a dose of about 1 to about 10 ml/kg and the ultrasonic radiation is of a low frequency and a low energy.

11. A ultrasonic radiation micro-bubble reagent for causing embolus, the reagent comprising Albunex, Optison, fluorocarbon micro-bubble reagent, medical salt- water base micro-bubble reagent, fso69, SHU454, SHU508, QW3600, a carbon-dioxide based reagent, or combinations thereof.

12. The reagent of claim 11, the carbon-dioxide based reagent containing a large molecule substance as a carrier for the reagent.

13. The reagent of claim 12, wherein the large molecule substance comprises blood, plasma, substitute blood, substitute plasma, Semi-lactose, Glucose, Lactose, Hetastarch, Human Serum Albumin, Dextran-70, Dextran-40, Dextran-10, Polygeline, Gelofusine, Poly-vidone or Dxypolygelatin.

14. The reagent of claim 12, wherein the carbon-dioxide gaseous based reagent is produced by adding carbon dioxide gas or liquid into a solution with the large molecule substance under pressure.

15. The reagent of claim 12, wherein the carbon-dioxide gaseous based reagent is produced by reacting an organic acid and  $\text{NaHCO}_3$ .

16. The reagent of claim 15, wherein the organic acid comprises vitamin C, lactic acid, citric acid, amber acid, tartar acid, lactose acid, semi-lactose acid, glucose acid, amino glucose acid, amino acid, or combinations thereof.

17. The reagent of claim 11, further comprising a marking or tracing isotope combined with a targeting substance.

18. The reagent of claim 17, wherein the combined marking or tracing isotope with a targeting substance comprises:  $^{125}\text{I}$ ,  $^{123}\text{I}$ ,  $^{99\text{m}}\text{Tc}$  ( $^{99\text{m}}\text{Tc-PYP}$ , etc),  $^{111}\text{In}$ ,  $^{11}\text{C}$ ,  $^{18}\text{F}$ ,  $^{13}\text{N}$ , and  $^{82}\text{Rb}$ , wherein the natural occurring positron integration element is a positron integration radioactive nuclide such as  $^{11}\text{C}$ ,  $^{13}\text{N}$ ,  $^{15}\text{O}$ ,  $^{18}\text{F}$ ,  $^{32}\text{P}$ ,  $^{35}\text{S}$ ,  $^{198}\text{Au}$ ,  $^{99\text{m}}\text{Tc}$ , ( $^{99\text{m}}\text{Tc-PYP}$ , etc...),  $^{111}\text{In}$ ,  $^{125}\text{I}$ ,  $^{131}\text{I}$ ,  $^{153}\text{Sm}$  - EDTMP  $\beta$ -injection treatment substance,  $^{90}\text{Y}$  - GTMS,  $^{89}\text{SrCl}_2$ , or a combination thereof.

19. The reagent of claim 17, wherein the targeting substance combined with the isotope includes: Human Serum Albumin ( $^{99\text{m}}\text{Tc-MAA}$ ), floral sodium, Colloid  $^{113\text{m}}\text{In}$ , Marking Erythrocyte, EHIDA,  $^{99\text{m}}\text{Tc}$  - PMT,  $^{131}\text{I}$ -rose, DTPA, EHIDA,  $^{99\text{m}}\text{Tc-DMSA}$ , calcium gluconate,

O-iodohippuric acid, molecular nucleus medical sole clone antibody, oncogene antisense oligonucleotides, or combinations thereof.

20. A medical device for forming capillary vessel embolus, comprising:  
an embolizing agent injecting portion;  
a positioning portion; and  
an ultrasonic treating portion.

21. The device of claim 20, wherein the embolizing agent injecting portion injects an ultrasonic micro-bubble imaging reagent.

22. The device of claim 20, wherein the positioning portion positions the device to the location where capillary blood vessel embolus needs to be formed

23. The device of claim 20, wherein the ultrasonic treatment portion comprises an ultrasonic energy output head with an energy and output frequency of about 20 to about 50kHz and an output power of about 1 to about 100W.

24. The device of claim 22, wherein the local positioning portion is an B Ultrasonic or X-Ray, CT or ECT.

25. An ultrasonic treatment head for a device for forming capillary vessel embolus, the head comprising:

a metal treating head;  
an electrode patch;  
a ceramic patch;  
a range change rod;  
a counter weight;  
a power route;  
a handler;  
a terminal; and  
a covered water purse.

26. The treatment head of claim 25, wherein it is hand-held apparatus

27. The treatment head of claim 25, wherein said head protrudes from the terminal, the water purse covers the terminal, and the water purse is made of latex.

28. The treatment head of claim 25, further comprising a drainage connection on the terminal.